The universal wheel

FIELD OF THE INVENTION

The present invention relates to the structure and shape of a universal wheel, and more particularly, relates to a novel structure and shape of a universal wheel which can be moved to any direction with the action of an outside force without rotation of the wheel.

BACKGROUND OF THE INVENTION

In regard to the conventional universal wheel, it can be moved along the direction of the applied outside force under the condition when its wheels rotate to the same direction as that of the outside force. When the outside force changes direction, the above conventional universal wheel requires a process for adjusting the direction of the wheels, which leads to a swaying phenomena during use and is not flexible. In addition, the direction of the applied load in the conventional universal wheel deflects a certain distance from the center of the wheels, which causes the wheel carrier to producea large deflection moment and affects the life of the wheel carrier. A conventional universal wheel also needs installation space for rotation of the wheels around the vertical shaft of the wheel carrier.

The present inventor has filed three patent applications dated on December in 2002, that are: utility model:02291781, patent for invention: 002130670.2 and PCT application: PCT/CN02/00880, with the same structure and title “A novel universal wheel”, the technical scheme of them is to install a Y- shape bracket onto a small drum-shaped roller. However, that has the following disadvantages: this kind of bracket has to pass through the interspace between the two big drum-shaped rollers

and to be fixed into the central position of the half hubcap grooves. This structure makes the wheel unfit for mounting other elements at the central part thereof, such as rolling bearings. The spacing at the end face of the big drum-shaped roller of the joint between the big and small drum-shaped rollers is bigger, which allows entry of dust and affects the rotation of the big and small rollers. The structure of the half hubcap at the two sides is complicated resulting in higher machining cost.

As shown by the related patent searching results, there is still not any report concerning the universal wheel which could be moved to any direction with the action of the outside force without rotation of the wheels during use of the single arrays of rollers.

SUMMARY OF THE INVENTION

The present invention provides a kind of novel universal wheel which overcomes the defects occurred in the existing universal wheel in regard to the structure, performance, installation and the use.

The technical scheme of the present invention for overcoming the technical problem is as follows: a kind of novel universal wheel consists of big and small drum-shaped rollers, bat-shaped brackets, long and short mandrels, side panels, bearings, a central shaft and a wheel carrier, which is characterized that the outer edge of the wheels is the wheel rim constituted by big and small drum-shaped rollers; a long mandrel is disposed at the center of the small drum-shaped roller and which is installed on the bat-shaped brackets, the lower parts of the left and right side of the bat-shaped brackets are each provided with one shaft hole respectively for fitting the short mandrels of the big drum-shaped roller, which makes the small drum-shaped roller to rotate freely on the bat-shaped bracket, while the big drum-shaped roller is fit over the short mandrel. Since the two ends of the big drum-shaped roller are provided

with the grooves for inserting the left end or the right end of the bat-shaped brackets and the big drum-shaped roller is supported between the two bat-shaped brackets, thus the big drum-shaped roller can be rotated freely; the big and small drum-shaped rollers are supported by the bat-shaped brackets and constitute the wheel rim; the bearings are provided at the center of the side panels and with the center of the bearings as the central shaft installing wheel carrier there on, as a result the universal wheel is formed by the above. The left end of the long mandrel is the shaft head in half-moon shape fitted with the same shape shaft hole on the base at the left side of the bat-shaped bracket, and the shaft hole at the right base of the bat-shaped bracket is connected with the shaft head of the long mandrel and to be riveted together. The shaft heads at the two ends of the short mandrel are machined into half-moon shape to be connected with the shaft holes in the same shape at the tilted lower part of the bat-shaped brackets. The two sides at the middle part of the said bat-shaped brackets are provided with protruding stages in flat trapezoidal shape, and also the groove holes in flat trapezoidal shape are provided at the two side panels in the corresponding positions with the above flat protruding stages on the bat-shaped brackets, in such a way the big and small drum-shaped rollers, the bat-shaped brackets and the long and short mandrels are assembled along the circumference direction as a single line, the two side panels are inserted into flat trapezoidal shape protruding stages, as a result the big and small drum-shaped rollers and the bat-shaped brackets are fixed between the two side panels. The big and small drum-shaped rollers are three to thirty pairs. Three or four universal wheels of the present invention are mounted onto the carriers while being used, which allows the carrier to be pushed to any direction.

The advantages of the present inventions are as follows: the universal wheel of the present invention can be pushed to any direction without rotation of the wheels in use, since the rim of it is provided with the big and small drum-shaped rollers which

form the double freedom structure, therefore it reduces the space for rotation. The universal wheel of the present invention is forced evenly and without eccentricity moment, therefore provides extended use. Since the present invention has overcome the disadvantages existed in the patents 02130670, 02291781.0 and PCT/CN02/00880, it is in reasonable structure and runs stable without noise due to the small gap, that is only 1mm, between the big and small drum-shaped rollers. In addition, the universal wheel of the present invention provides a good seal, which prevents dust from entering into the inner chamber of the rollers, therefore the universal wheel of the present invention is in reasonable structure, with good technics, convenient for installation, with long life and lower cost.

BRIEF DESCRIPTION OF THE DRAWINGS

The Fig 1 is the general front view of the present invention;

The Fig 2 is the general left view of the present invention;

The Fig 3 is sectional views of the assembled small drum-shaped roller, the long mandrel and the bat-shaped brackets;

The Fig 4 is the structural view of the long mandrel of the present invention;

The Fig 5 is perspective structural view of the bat-shaped brackets of the present invention;

The Fig 6 is the sectional views of the assembled small drum-shaped roller, bat-shaped brackets and the big drum-shaped brackets;

The Fig 7 is the perspective view of the side panel of the present invention; and

The Fig 8 is partial sectional view of the universal wheel of the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

Referencing the Figs 1-8, the Fig 1 shows the technical scheme of the novel universal wheel consisted of four pairs of the big and small drum-shaped rollers. The shaft heads at the two ends of the long mandrel 2 are formed in a half moon shape 21, refer to Fig 4. The long mandrel 2 is passed through the shaft hole 11 at the right base 14 of the bat-shaped bracket 3, and then it passed into the central hole 24 of the small drum-shaped roller 1, and finally it is inserted into the half moon shaft hole 12 at the left base 15 of the bat-shaped bracket 3, referencing the Figs 5 and 3. Thus the small drum-shaped roller 1 is fixed at the central position of the bat-shaped bracket 3 and can be rotated freely. At this time, the half-moon shape shaft head 21 of at the right end of the long mandrel 2 is riveted 22 to the right base 14 of the bat-shaped bracket 3, there is a half-moon shaft hole 13 at the left and right part of the bat-shaped bracket 3 respectively, refer to the Figs 5 and 3, the big drum-shaped roller 4 is fixed between the tilted lower parts 16 or 17 of the bat-shaped bracket 3 through the short mandrel 5, the shaft heads at the two ends of the short mandrel 5 are formed into half-moon shape to connect with the same shape shaft hole 13 at the tilted lower part of the bat-shaped bracket 3. Thus the end 23 of the big drum-shaped roller 4 is installed between the two bat-shaped brackets 3 and can be rotated freely, referencing the Fig 6. The flat protruding stages 18 are provided at the two sides at the central part of the bat-shaped bracket 3, referencing the Fig 5, and there is also provided with the flat trapezoidal grooves 20 corresponding to the flat trapezoidal protruding stages 18 at the bat-shaped bracket 3, referencing the Fig 7. Referring to the Fig 8, the assembled element (refer to fig 3) by small drum-shaped roller 1, bat-shaped bracket 3 and long mandrel 2 together with the big drum-shaped roller 4 and the short mandrel are arranged along the circumference direction in order. And then the flat grooves 20 at the side panels 6 are aligned with the flat protruding stages 18 on the bat-shaped bracket 3 and inserted with each other, the bearings 8, bushing 7 and central shaft 9 are mounted at the central part 24 of the two side panels 6, referencing the Fig 2, thus

the universal wheel is formed, refer to Fig 8. The universal wheel is fixed at the central part of the wheel carrier 10, which constructs the novel universal wheel, refer to Fig 1. The carrier can be pushed to any direction by installing three or four universal wheels of the present invention at the lower part of the frame of the carrier.